There is another point to be made concerning the usefulness of componential or semantic feature analysis. The analysis of kin terms served as an exemplary model of how to investigate cultural systems of meaning. The feature analysis of kin terms served as a central part of a particular paradigm which attempted to achieve precision and naturalness. In such an analysis the native categories are derived from an emic analysis of the way the natives discriminate things in their world rather than by imposing categories from the outside.

Thus one can trace a direct path from the call for structural analyses by Saussure, through the feature analyses of phonemes by the Prague School, to the semantic feature analyses of kinship terminologies. This is a line of research which served at the time as an example of the very best work done in the field. Those who rejected this kind of analysis of kin terms generally did so *not* because they had a better method for the analysis of these terms, but because they rejected either part of the agenda (that the road to understanding native systems of thought lay primarily in the analysis of native systems of terminology rather than the analysis of ritual or social action), or rejected the entire agenda (native systems of thought are not of interest because that is not the way to understand society and culture).

It is difficult to explain the beauty which a semantic analysis of kinship terms held for some anthropologists in 1960. In the present intellectual milieu, this type of analysis seems specialized, arcane, and formalistic. In 1960, the effect was quite different. Then such an analysis was experienced as a nearly magical process of discovery in which elegant simple patterns emerged from an initial jumble of kin terms and kin types. The patterns came out of the data, and, once seen, were unforgettable. In present day anthropology the field is less interested in discovery procedures and formalization. What was once generally considered exemplary work is now a matter of interest to only a very small number of kinship specialist.

3 The classic feature model

The particular kind of structure found for kinship terms is termed a *paradigm* – a different sense of the term than the "paradigms" of Kuhn's scientific revolutions. *In a complete paradigm all possible combinations of features actually occur.* An example of an almost complete paradigm in English is composed by the terms *man, woman, boy, girl,* and *baby.* The features here are *male* vs. *female* and *adult* vs. *immature* vs. *newborn.* A box diagram of this paradigm is presented below in Figure 3.1.

A similar paradigm for the domain of horses is presented in Figure 3.2. In both cases the paradigm is not fully complete because the term for a newborn – *foal* or *baby* – leaves sex unspecified, and for horses there are no terms for neutered females or neutered immature or newborn horses (perhaps because such types would be a rare occurrence).

	male	female
adult	man	woman
immature	boy	girl
newborn	baby	

Figure 3.1 Paradigmatic structure of English terms for *humans*

	male	female	neuter
adult	stallion	mare	gelding
immature	colt	filly	
newborn	foal		

Figure 3.2 Paradigmatic structure for English terms for *horses*

	subject	object	adjective	possessive
1st person				
singular	I	me	my	mine
plural	we	us	our	ours
2nd person				
singular	you	you	your	yours
plural	you	you	your	yours
3rd person				
singular				
male	he	him	his	his
female	she	her	her	hers
plural	they	them	their	theirs

Figure 3.3 Paradigmatic structure for English pronouns

	subject	object	adjective	possessive
2nd person				
singular	thou	thee	thy	thine
plural	ye	you	your	yours

Figure 3.4 Paradigmatic structure for second person pronouns used in King James Bible

The pronouns in current English constitute another well-known paradigm (see Figure 3.3). This paradigm is incomplete in that the distinction of gender is not made for 1st or 2nd person, or for 3rd person plural. Although the 2nd person has the same external form for singular and plural, the plural forms of *you* and the singular forms of *you* are actually different terms – context usually makes clear which sense is intended. In the King James version of the Bible – c. 1610 – the plural and singular 2nd person forms of the terms were clearly differentiated, as shown in Figure 3.4.

An interestingly different pronoun system is found in Hanunóo, a Philippine language. Harold Conklin (1969), who did the analysis of this system, found a complete paradigm constructed from three binary dimensions: *inclusion* vs. *exclusion of the speaker*, *inclusion* vs. *exclusion of the hearer*, and *minimal* vs. *non-minimal membership*. Conklin notes that the pronoun systems in Tagalog, Ilocano, Maranao, and some other Philippine

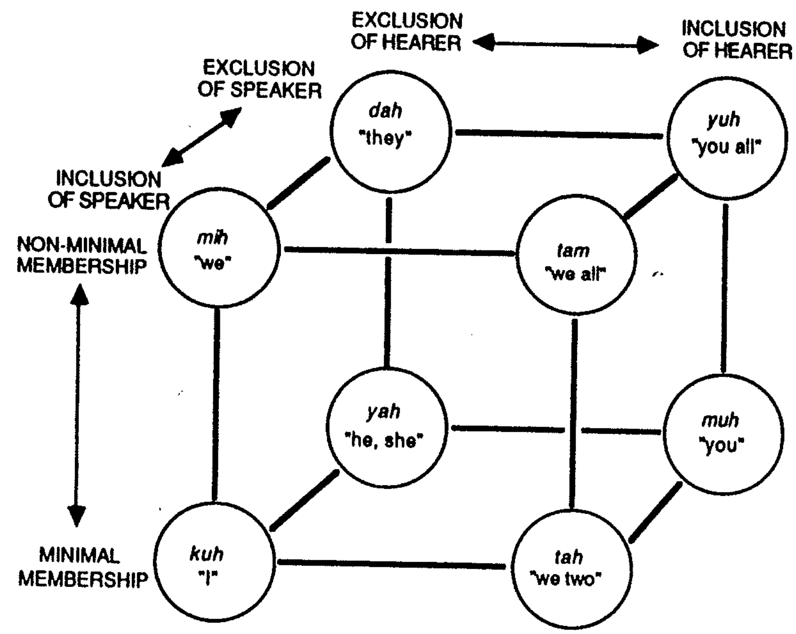

Figure 3.5 Paradigmatic structure of a Hanuóo pronominal set (adapted from Conklin 1969)

languages have a similar structure. The structure of this system is presented in diagrammatic form in Figure 3.5. It has a symmetric beauty that English lacks.

Complete paradigms turned out to be relatively rare in natural languages: typically only a few domains in each language display this type of structure. A possible reason that complete – or even partially complete – paradigms are so rare is that the world does not usually present us with sets of objects which display *all* possible combinations of features. The most extensive paradigms are usually found in domains that involve relationships, such as kin terms and pronouns, probably because of the greater combinatorial possibilities created by relationships. And, in many cases, even where distinctions could easily be made (we could have separate terms for baby boys and baby girls), people are not always motivated to make them.

Feature analysis, however, is not limited to analyses of paradigms. Feature analysis can be carried out on any set of contrasting terms. As Frake put it:

> In a few fields, notably in kinship studies, anthropologists have already successfully pushed an interest in terminological systems beyond a matching of translation labels . . . The recognition that the denotative range of kinship categories must be determined empirically in each case, that the categories form a system, and that the semantic

> contrasts underlying the system are amenable to formal analysis, has imparted to kinship studies a methodological rigor and theoretical productivity rare among ethnographic endeavors. Yet all peoples are vitally concerned with kinds of phenomena other than genealogical relations; consequently *there is no reason why the study of a people's concepts of these other phenomena should not offer a theoretical interest comparable to that of kinship studies.*
>
> *The analysis of a culture's terminological system will not, of course, exhaustively reveal the cognitive world of its members, but it will certainly tap a central portion of it.* Culturally significant cognitive features must be communicable between persons in one of the standard symbolic systems of the cultures. A major share of these features will undoubtedly be codable in a society's most flexible and productive communication device, its language . . . *To the extent that cognitive coding tends to be linguistic and tends to be efficient, the study of the referential use of standard, readily elicitable linguistic responses – or terms – should provide a fruitful beginning point for mapping a cognitive system.* (Italics added) (Frake 1962)

A theoretical vocabulary developed rapidly in the late 50s and early 60s for this "study of the referential use of standard, readily elicitable linguistic responses." The basic terms of this vocabulary are presented below.

A *lexeme* is a lexical unit which has a meaning which cannot be derived from the meaning of its sub-units. For example, a *white house* (a house which is white) is a complex term consisting of two distinct lexemes, while the *White House* (the residence of the president) is a complex term which comprises a single lexeme.

A *domain* is an area of conceptualization like space, color, the human body, kinship, pronouns, etc. Not all domains in a language are labeled with a single lexeme. Typically a domain is differentiated by more specific *lexemes*.

A class of objects – things in the world – referred to by a linguistic term may be called a *segregate*, or *denotata*, or if the things are biological, *taxa* (singular *taxon*). *Taxa* may correspond to groupings at the species, genera, families, or phyla level.

The objects in a segregate will usually share a number of *attributes* – properties they hold in common. A *semantic feature* of a term corresponds to a *criterial attribute* of the objects in a segregate, that is, to an attribute which distinguishes the objects in this segregate from objects in other segregates.

A *dimension* consists of a set of contrasting features. For example, the dimension of *sex* consists of the contrasting features *male* vs. *female*, and the dimension of *relative age* consists of the contrasting features *elder* vs. *younger*.

A series of terminologically contrasting segregates form a *contrast set*. Charles Frake (1962) uses the example of someone ordering food at an American lunch counter where the most inclusive segregate would be the

<table>
<tr><td colspan="5">something to eat</td></tr>
<tr><td colspan="2">sandwich</td><td colspan="2">pie</td><td>ice-cream bar</td></tr>
<tr><td>hamburger</td><td>ham sandwich</td><td>apple pie</td><td>cherry pie</td><td>Eskimo pie</td></tr>
</table>

Figure 3.6 Taxonomy for *something to eat* (adapted from Frake 1962)

class of available foods. One contrast set would include the segregates referred to by terms like *sandwich*, *hamburger*, and *apple pie*. Frake makes the point that a "rainbow" – while distinct from any of the other segregates – does not form a part of this contrast set because it does not function as an uncontrived alternative to any of the other items.

A *taxonomic* relation occurs when one segregate or taxon *includes* other segregates or taxa; for example the segregate referred to by the term *pie* includes the contrast sets *apple pie* and *cherry pie*.

Frake presents the small taxonomy of lunch counter foods (Figure 3.6). Whether a set of terms forms a paradigm or a taxonomy depends on the way in which the distinctive features are structured. Thus, given the terms L1, L2, . . . Ln, and the contrasting features a1, a2, b1, b2, . . . z1, z2, if a set of features is structured:

L1 = a1 b1
L2 = a1 b2
L2 = a2 b1
L2 = a2 b2

the terms will form a paradigm because all possible combinations of the "a" and "b" features occur. For example:

uncle	=	ascending generation	male
aunt	=	ascending generation	female
nephew	=	descending generation	male
niece	=	descending generation	female

which can be represented as in the box diagram for English kin terms in the preceding chapter. However, if the features are structured:

L1	=	a1	—
L2	=	a1	b1
L3	=	a1	b2

where "—" stands for the absence of any feature specification, the result will be that L1 is taxonomically related to L2 and L3. For example:

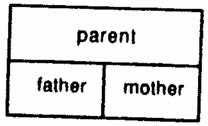

Figure 3.7 Taxonomy for *parent*

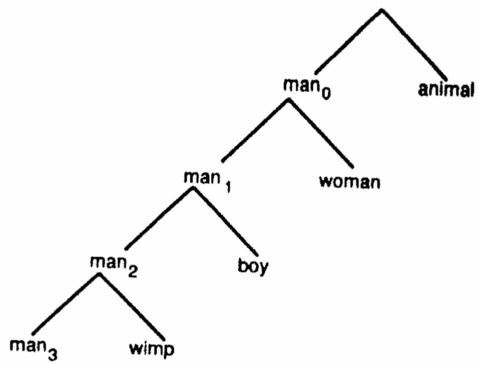

Figure 3.8 Taxonomic representation of polysemous sense of *man*

parent	=	consanguineal ascending	direct —
father	=	consanguineal ascending	direct male
mother	=	consanguineal ascending	direct female

The term *parent* is unspecified for gender. Except for the gender features *male* vs. *female* the terms *father* and *mother* have exactly the same features as the term *parent*. A standard box diagram for this small taxonomy is shown in Figure 3.7.

The point here is that *the way in which a set of terms is organized is derived from the way the features of these terms are structured relative to each other.* A complete paradigm, or incomplete paradigm, a taxonomy, or a mixture of a taxonomy and a paradigm can all be created by simple patterns of distinctive features.

Polysemy

A notable fact about most natural language terms is that they are *polysemous* – that is, most terms have more than one sense. A classic example is the term *man*. The term *man* has a number of related meanings which can be represented in a simple taxonomic hierarchy (see Figure 3.8). With respect to the feature structure of these senses of man, we find the following:

man_0	=	human			
man_1	=	human	male		
man_2	=	human	male	adult	
man_3	=	human	male	adult	courageous

In linguistics, when there are a pair of terms like *man* and *woman*, and one of the pair (*man*) has a more general sense that includes both members of the pair, this term is called the *unmarked* term. The term which does not include both (*woman*) is called the *marked* term. This type of situation is very common in all languages, and occurs not only in lexical items as illustrated above, but also in phonology and grammar (Greenberg 1966). In the case of *man* each of the senses (man_1, man_2, and man_3) is unmarked with respect to its oppositional senses (*woman*, *boy*, and *wimp*) because in each case there is a more general sense of *man* which includes both of the more specific senses. Note that the marked term *woman* is also morphologically *marked* by the addition of *wo-* to *man*. Similarly, *fe-male* and *author-ess* are also morphologically marked. However, *boy* and *wimp* are not morphologically marked, but are *semantically* marked). Thus, sometimes, but not always, the semantically marked term also has a special morphological marker.

This phenomena of marking is very general. It occurs at the phonological and grammatical levels of language as well as the lexicon, and is found in all languages. As Joseph Greenberg says:

> The pervasive nature in human thinking of this tendency to take one of the members of an oppositional category as unmarked so it represents either the entire category or *par excellence* the opposite member to the marked category can be shown to operate even within the austere confines of mathematical and logical symbolism. Thus negative is always taken as the marked member of the positive–negative opposition; –5 is always negative, but 5 by itself is either the absolute value of 5, that is 5 abstracted from its sign value, or +5 as the opposite of the marked negative category. So, in logic *p* was used ambiguously either as the proposition *p* abstracted from its truth value as either true or false or, on the other hand, for the assertion of the truth of *p*. Note that logicians use the term "truth value", involving the unmarked member, not "falsity value" to express the over-all category which has truth and falsity as members so that, as usual the unmarked member stands for the whole category in the position of neutralization. (1966:25-26)

A common kind of marking occurs with pairs of contrasting adjectives such as *good–bad, many–few, long–short, wide–narrow, deep–shallow*. In each of these pairs the first term is the unmarked case. It is the first term which is unmarked because it is the first term which refers to the entire dimension. We ask "how good is the wine?" if we do not know whether wine is either good or bad, thus using the term *good* to refer to the entire dimension. We only ask "how bad is the wine" if we already know it is bad, and we want to know *how* bad.

It is generally the case that the unmarked term occurs with higher frequency than the marked term. Table 3.1, taken from Greenberg (1966), gives the Lorge magazine count for the frequency of these adjective pairs in English. There are

Table 3.1. *Lorge magazine count*

Term	Frequency	Term	Frequency
Good	5,122	*Bad*	1,001
Many	3,874	*Few*	2,730
Long	5,362	*Short*	887
Wide	593	*Narrow*	391
Deep	881	*Shallow*	104

a number of possible explanations for the fact that the unmarked term usually occurs more frequently than the marked term. One explanation is that because the unmarked member is typically of greater interest to people, it is both referred to more frequently and perceived as more appropriate to serve as the more general term. Another explanation is that it is cognitively more efficient to make the high frequency term the unmarked term, since if one of the pair of terms is to be used as the upper level term the more frequent term will come to mind more easily. A third explanation is that since the unmarked term has at least two senses it therefore has more chance to be mentioned than the marked term. Probably all these factors have varying degrees of influence on the frequencies depending on the particular set of terms.

Conjunctivity (or non-disjunctiveness)

In all of the examples used so far, it has been assumed that the features which define a term are conjunctively related; that is, they *jointly* define the term and so are connected together by the logical relationship *and*. For example, an *uncle* is a collateral *and* a relative one generation above ego *and* a male. Such a term is conjunctively defined. However, one can define a class of kin types quite differently – one could define some relative (say a "blove") as someone who is *either* a female relative *or* a younger generation relative. When a term is defined as *either* X *or* Y, it is said to have a *disjunctive* definition. Such terms are relatively rare. It could be said that polysemy is a kind of disjunctiveness, and polysemy is quite common. For example, the term *man* could be said to refer to *either* a human, *or* a human male, *or* a human adult male, *or* a courageous human adult male. The standard analysis is to say that these are different but related *senses* of the term *man*, rather than one sense which is defined by a disjunctive set of features.)

A good example of an English word which has a particular sense requiring a disjunctive definition is the term *strike* in baseball. A strike can be:

(a) *either* a "swing" at the ball by the batter which did not hit the ball,
(b) *or* a ball thrown over the plate between the knees and the shoulders and called a "strike" by the umpire,

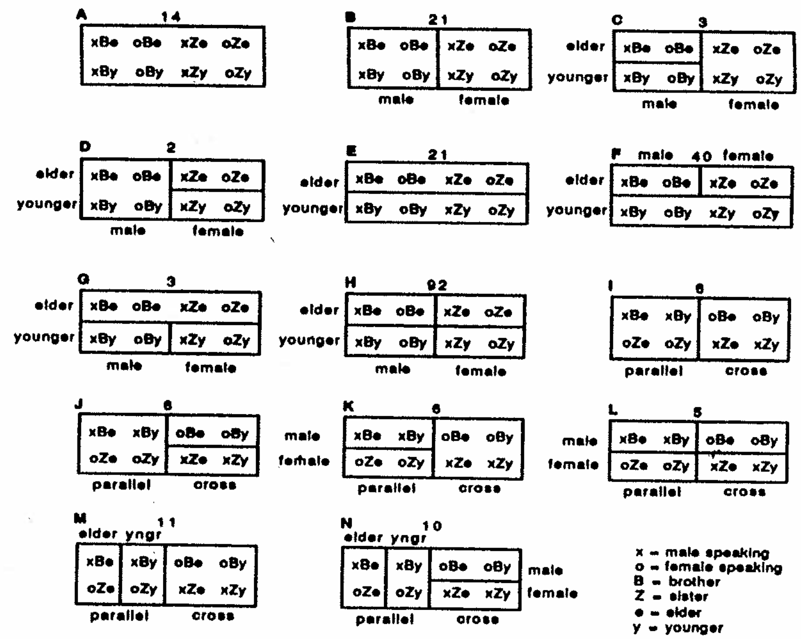

Figure 3.9 Types and frequencies of sibling terminology

(c) *or* a ball hit "foul" and not caught (unless the batter already has two strikes, in which case the uncaught "foul" does not count as a strike).

Note that such definitions are hard to learn – there are Americans who occasionally watch baseball who have not fully learned what a strike is. Disjunctiveness is thought to be rare because it is much more difficult to learn disjunctive classes than conjunctive classes (Bruner, Goodnow, and Austin 1956). Furthermore, in this particular case, the various classes of events that are all called *strikes* are not totally unrelated. The prototypic *strike* is a swing and miss – the batter should have hit the ball into the field but did not. The *called strike* and the *foul ball strike* are also instances in which the batter should have hit the ball into the field but did not. Thus the different classes of events called a *strike* are related to each other; they are all examples of failures of the batter. Thus we can say the connection between the different senses of *strike* are *motivated*, meaning they have reason to be grouped together. George Lakoff, in his book *Women, Fire, and Dangerous Things*, gives numerous examples of categories like *strike* which have core classes and motivated extensions.

This does not mean that purely disjunctive categories never occur. In a cross-cultural study of sibling terms Sara Nerlove and A. K. Romney (1967) found that the overwhelming majority of terms were conjunctively defined, but there were a small number of disjunctive cases. Figure 3.9 presents a summary of the

Nerlove and Romney data. Each of the boxes from A to N presents a type of sibling terminology. The number at the top of the box gives the frequency with which this particular kind of sibling terminology occurs in a world-wide sample of 245 societies. These are all the types which occur more than once out of the 4,140 logically possible types of sibling terminologies which can be created from eight kin types[1], not counting four societies which had disjunctive systems – about 1.6% of total, and one society (Pawnee) which had a unique system.[2]

In each box are the eight kin types that can be constructed by distinguishing sex of relative, sex of speaker, and relative age. For example, the expression "xBe" stands for a *male ego's elder brother*, while the expression "oZy" stands for a *female ego's younger sister.* (The symbol Z rather than S is used for "sister" because in single letter kin term notation S usually stands for "son.") Fourteen societies in Figure 3.9 have type A sibling terminology – a simple system in which no distinctions are made, and there is just one term – "sibling." Type B, found in twenty-one societies, divides the eight kin types into two terms, one consisting of *male* siblings, the other consisting of *female* siblings. English is an example of this kind of system. Type C is like type A except that it has three terms; elder brother is distinguished from younger brother, but there is just one term for sister. The most common kind of sibling term system is type H, occurring in ninety-two societies, in which there are four sibling terms, one for older brother, one for younger brother, one for elder sister, and one for younger sister.

Types G through L have a basic distinction which is not found in English, but which we encountered in Chiricahua. All of these types make the *cross-sex* vs. *parallel-sex* distinction, in which a sibling of the same sex as ego is distinguished from a sibling of the opposite sex as ego. Type G presents the simplest version of this kind of system with just two terms, one for *cross*, the other for *parallel* siblings. The other five types add other features to the *cross/parallel* partition, resulting in systems with more than two terms. Type L, for example, which occurs in ten societies, has three terms, one for elder parallel sibling, one for younger parallel sibling, and one for any cross-sex sibling.

Figure 3.10 presents the Hopi sibling terminology system (Eggan 1950). This is a disjunctive system – one of the four in the Nerlove and Romney sample. It has four terms. Three of the terms can be conjunctively defined; the

[1] 4,140 is a surprisingly large figure for the number of kinship terminologies which can be created from just eight kin types. Combinatorial problems of this sort often produce unexpectedly large numbers of possibilities. The mathematics is presented in detail in Nerlove and Romney 1967.

[2] Types F, H, M, and N include twenty-one societies which also made tertiary distinctions in sibling terms (a "tertiary" distinction subdivides a secondary distinction of two kin types into single kin types). These tertiary distinctions do not create disjunctive terms, and so do not contravene the conclusions based on the simplified types.

	male		female	
elder	xBe	oBe	oZe	xZe
younger	xBy	oBy	oZy	xZy

Figure 3.10 Hopi sibling terminology

first as *elder brother*, the second as *elder sister.* The third term is used only by a *male ego* for a *younger sister.* The fourth term, however, consists of either a *male ego* referring to a *younger brother* or a *female ego* referring to a *younger sibling*. There is no simple conjunctive definition for this term. In summary, for a Hopi male the sibling system looks like type F, with primary distinctions of both relative age and sex of relative, while for a Hopi female the system looks like type E, where relative age is a primary distinction and sex of relative is only a secondary distinction subdividing the elder side.

The cross-cultural sibling data[3] indicates that there is an extremely powerful tendency for humans to define terms conjunctively rather than disjunctively.[4] However, it should be pointed out that the sibling data used here examines only *one sense* of these sibling terms – the *genealogical* sense. Just as English has a number of senses for the terms *brother* and *sister* (a *sister* can also be a woman in a religious order, or two objects which have some kind of common historical origin, such as *sister languages*, etc.) so we can expect that in most if not all of the 245 societies in the sample there were a variety of other senses for their sibling terms. What the sibling data actually shows is that there is a powerful tendency to define each *particular sense* of a term conjunctively. Paradoxically, it is probably because of the powerful tendency to expect things to be susceptible to conjunctive definition that we abstract out the different senses of a term – otherwise we would simply define every so called "polysemous" term with a long disjunctive definition rather than presenting different conjunctive definitions for each sense.

So far this chapter has presented a brief outline of part of what is called *ethnographic semantics*. A fuller presentation of work in ethnographic semantics can be found in Stephen Tyler's *Cognitive Anthropology* and in Oswald Werner's *Systematic Fieldwork*. The point of the materials presented in this chapter has been to show that the feature model, first successfully applied to

[3] There is a controversy about the status of the term "data." Some people say that "data" is a plural noun (with "datum" as the singular). However, to be a plural it must be a count noun – only count nouns have plural forms. Count nouns are things one counts: "one house, two houses, a thousand houses." Yet no one says "two data" or "a thousand data." Why not? Because "data" is almost always used as a mass noun, like "sand" or "water," not a count noun, and mass nouns are treated as singular.

[4] Nerlove and Romney's sibling data has been analyzed further by David B. Kronenfeld (1974). See also Epling, Kirk, and Boyd (1973) for an analysis of the historical relations between sibling terminologies among twenty-three Polynesian societies using Nerlove and Romney's classification methods.

Table 3.2. *Kinship terms in six cultures*

Society	Number of terms	$\log_2$ of N in terms	Society size	Technological level
Kariera (Australia)	23	4.52	Hundreds	Foraging
Comanche (US)	37	5.21	Hundreds	Foraging
Lapps (European Arctic)	49	5.61	Hundreds	Nomadic herding
Truk (Micronesia)	14	3.82	Thousands	Horticulture and fishing
Japan	39	5.29	Millions	Modern industrial
United States	37	5.21	Millions	Modern industrial

kin terms by Lounsbury and Goodenough, was quickly generalized to the study of the entire lexicon with the explicit agenda of providing, as Frake (1962:87) puts it, "a fruitful beginning point for mapping a cognitive system." Rather than move further into the details of ethnographic semantics, the rest of this chapter will attempt to show some of the ways the feature model was found to be related to other cognitive processes, such as memory, analogizing, and making similarity judgments.

Short-term memory

One interesting connection between the feature model and the limitations of humans as information processors was made by Anthony Wallace (1964). Wallace's starting point was the observation that *although the social and technological complexity of societies vary hugely, the size of the system of terms for kin does not* (see Table 3.2).

In order to transform the number of terms of a system into a number which has the capacity to measure information complexity, Wallace computed $\log_2$ of 1/L, where L equals the number of terms in a system. This figure gives the number of binary choices necessary to produce a terminological system of size L. From this table Wallace concluded:

> Two facts are apparent, even when this small group of terminologies is considered: first, there is no *necessary* relation between complexity of the kin terminology system and the size and technological level of the society; and second, *each of the systems can be accommodated by a taxonomic space requiring only six binary dimensions or less.* (Italics added) (1964)

With six binary dimensions it is possible to create a maximum of sixty-four categories, but not more. Wallace goes on to discuss the size of other *taxonomic spaces*, or *institutionalized systems of discrimination* – what is called here a "contrast set." He points out that the number of segmental phonemes reported for natural languages ranges between thirteen to forty-five. The number of grammatically significant forms of the English verb is less than sixty-one; there are fifty-two playing cards in a standard deck of cards, sixty-four squares on a

chess board, twelve combinations in a pair of dice, less than sixty-four basic number terms in English, fewer than sixty-four military ranks, fewer than sixty-four kinds of players on various sport teams, etc.

Considering why there should be such a strong limitation on "institutionalized systems of discrimination," Wallace points out that since such limitations are found in a variety of domains and across a wide range of kinds of societies, it is reasonable to assume the limitation is of a psychobiological nature. Wallace notes that his results correspond closely to Miller's, although he had not read Miller's famous 1956 paper "The Magical Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information" until a reviewer pointed it out to him. This correspondence is especially impressive given the very different kinds of data and method involved.

Miller's 1956 paper is a case of Kuhn's point that certain pieces of research become prototypical examples in the formation of a new paradigm. This paper, which shows with the most carefully collected experimental data that the number of simultaneous discriminations that individuals can make falls off rapidly at about seven bits of information, became a central facet of the new cognitive models of the mind. Uniting work in communication theory and basic psychophysical measurement, it gave evidence of inbuilt constraints and structure in cognitive processing. It showed the direction in which a new theory of the mind might be constructed.

The strong limitations on the number of discriminations that humans can make simultaneously also limits the number of levels of folk taxonomies. After careful review, Berlin, Breedlove, and Raven (1973) concluded that folk taxonomies, unlike scientific biological taxonomies, rarely exceed five levels, although sometimes there are a few items at a sixth level. The reason for this comes directly from the structure of features in a taxonomy. As illustrated above, each lower level of a taxonomy adds a *new* feature dimension to the preceding level. If there were more than six levels, there would have to be more than six features present in the lowest level term.

It is important to note that this limitation in information processing – usually called the 2^7 rule after Miller (rather than 2^6 after Wallace) applies only when a person must make a number of simultaneous discriminations. Simultaneous discriminations divide the world into some number of things which one is holding in mind at the same time. This type of memory is called *short-term memory* or *working memory* by psychologists.[5] While there are a number of unresolved complexities about this type of memory, it is clear that it contrasts sharply with *long-term memory*. Humans have huge long-term memories,

[5] *Short-term memory* is the older term. Currently most psychologists use the term *working memory* to refer to a system of limited temporary storage and information manipulation. Working memory is thought to be divided into three subsystems: a phonological loop which stores and rehearses speech sounds, a visuospatial sketch pad which stores and manipulates visual images, and a central executive which controls attention. See Baddelely 1990.

remembering many hundreds of thousands of things. However, these items cannot all be brought to mind at the same time, but rather *serially* – one remembers first one thing, then another.

In a sense, this limitation makes an odd creature out of the human. With a capacity to remember many hundreds of thousands of things, every item that gets placed in memory must first be discriminated and placed in short-term memory which can only contain six or seven discriminations. This creates a tight bottleneck in the flow of information from the world to long-term memory. It limits the complexity of our terminological systems, our phonology, our artifacts and instruments, our art – all of culture.

Chunking

Given this tight bottleneck, human culture would not be possible were it not for the process of chunking. This process, described in Miller's 1956 paper, is the means by which we are able to circumvent the limitations of short-term memory. Basically, in chunking humans group a number of things together into one thing. A common example is the chunking of digits. Given a random set of digits it is hard to hold a very large number in mind long enough to be able to repeat them. However, if the digits can be grouped together into a small number of units, there are fewer things to remember. For example, if presented the digits

69325754

most people will have a hard time recalling all eight numbers. But given the digits

19891990

most people will have an easy time recalling the digits. This is because most people hear only two numbers in this sequence – *1989* and *1990*. So instead of having eight distinct things to remember, one has only two easy things to remember, and remembering these two things generates the eight digits.

The power of the process of chunking is even more apparent with letters than numbers. For example, compare the difficulty of remembering

lsnsyaia

with the ease of remembering

analysis

The letters are the same, but the organization of the letters corresponds in the second case to a well-practiced chunk. With letters and phonemes the chunking not only extends to syllables and words, but to whole phrases and even sentences.

This kind of chunking also occurs with the respect to semantic features. Consider terms like *buy* and *sell*. *Buying* involves a complex set of discriminations: (1) one person is the *buyer*; (2) another the *seller*; (3) there must be some object to be *purchased*; (4) the *ownership* of the object changes from the *seller* to the *buyer* (5) in exchange for *money* (6) whose *ownership* changes from *buyer* to *seller*. Charles Fillmore (1977) has called this the basic "commercial event" scene.

Note that in the analysis given above six major discriminations need to be made. Six discriminations is within the capacity of short-term memory. However, each of these discriminations is itself quite complex. For example, what is involved in making the discrimination that something is *owned* by someone? *Ownership* involves discriminations about the kinds of *rights* that someone has over something; typically these include the *right* to *use*, *give*, or *exchange* the object whenever one wishes. And to have a *right* means roughly that there is a *social agreement* that one can take some actions with regard to some class of objects without *interference* from others. So in the discrimination of *ownership* there is the chunking of a number of other discriminations contained in the notion of *rights*. As a result of chunking the discrimination of *ownership* becomes a single feature of the term *buy* despite its complexity.

Without this kind of chunking we humans would be extremely limited in what we could discriminate and hence remember. We might have some number of very simple discriminations which we could make and use as features of terms, but the building of level upon level of complexity, so typical of human culture and human language, would not be possible. Simple discriminations, like *who* is in physical *possession* of *what* might be made, but more complex discriminations involving things like "rights" would be improbable without chunking, and even more complex discriminations built out of exchanges of kinds of rights over kinds of things (like *buy*, *loan*, *mortgage*) would simply be impossible. Even more complex discriminations built out of certain kinds of *failures* for certain kinds of commercial exchanges to occur (like *steal*, *default*, and *defraud*) would be wildly impossible. In general, for successive levels of chunking to occur there must be symbols of some type to hold the meaning of chunked information in a single unit. Thus there is a tight relation between the limitations of the human as an information processing system and the structure of language and human culture. *Complex human culture would be impossible if there were no linguistic symbols to help as chunking devices in making complex discriminations.*

Analogy

Another process which has a direct relation to semantic features is the process of *analogizing*. Standard analogies are of the form: *water* is to *wine* as *bread* is to *cake*. In this analogy *water* and *wine* are both "things to drink", but *wine* is the more "expensive" and "celebratory" drink. The same pattern of features are found for the terms *bread* and *cake*. Both are "things to eat," but *cake* is the more "expensive" and "celebratory" food.

It is common to give analogies as problems. For example: *father* is to *son* as *aunt* is to *whom*? We can represent this problem in feature form as follows:

father	:	*son*	::	*aunt*	:	*(niece)*
direct	=>	direct		collateral	=>	(collateral)
G1	=>	G1		G1	=>	(G1)
+	=>	–		+	=>	(–)
male	=>	male		female	=>	(female)

The rule used to produce the parenthesized features is simply to repeat the *relationships* that occur with respect to the first pair of terms: if a feature stays the same for the first pair of terms then the corresponding feature should also stay the same for the last pair of terms. But if a feature changes, the same change should occur in corresponding features for the second pair of terms. Thus both *father* and *son* are *direct* relatives, so no change should be made for the corresponding feature of *collaterallity* with respect to the second pair of terms. With respect to the *ascending* (+) vs. *descending* (–) features, however, *father* is *ascending* while *son* is *descending*, so since *aunt* is *ascending* the missing term should be *descending*.

Once the missing features have been filled in by this simple pattern matching process, the term that corresponds to these features is selected. In English, a *collateral, one generation from ego, descending, female* is a *niece*.

This kind of simple pattern matching of features is not the only way of computing an answer to analogy problems. For instance, consider the following analogy problem: *grandfather* is to *father* as *uncle* is to *whom*? The feature pattern matching procedure yields the following results:

grandfather	:	*father*	::	*uncle*	:	*(brother)*
direct	=>	direct		collateral	=>	(direct)
G2	=>	G1		G1	=>	(G0)
+	=>	+		+	=>	(+)
male	=>	male		male	=>	(male)

The relative who is a *direct, zero (or same) generation, ascending male* is an *older brother*. Since English does not have a distinct term for one's older brother (although many languages do) the best answer is simply *brother*. However, approximately 50% of a class of undergraduate university students give a different answer to this problem. They say that the answer is *cousin*. When asked why they gave this answer, they said that just as a *father* is the child of a *grandfather*, a *cousin* is the child of an *uncle*. These respondents are doing a different kind of computation to get from term to term in the analogy. Instead of doing a *same/different* pattern matching with features, they compute a *relative product* relation between terms. The relative product in this case is computed with the relation *parent of/child of*. Other common relative product relations found for kin terms are A is the *spouse of* B and A is the *sibling* of B.

In some cases, both methods will give the same answer. For example: *father* is to *mother* as *uncle* is to *whom*? Both feature matching and relative product computation yield the same answer – *aunt*. Using relative products, we can see that just as a *mother* is the *spouse of* a *father* so an *aunt* is the *spouse of* an *uncle*. The pattern matching of features is:

father	:	*mother*	::	*uncle*	:	*(aunt)*
direct	=>	direct		collateral	=>	(collateral)
G1	=>	G1		G1	=>	(G1)
+	=>	+		+	=>	(+)
male	=>	female		male	=>	(female)

Finally, consider the following problem: *father* is to *mother* as *brother* is to *whom*? Here the relative product result would be *sister-in-law* because just as *mother* is the spouse of a *father*, so *sister-in-law* is the spouse of a *brother*. However, given this question, the great majority of respondents give the pattern matching answer; *sister*. Perhaps so few people use the relative products transformation in this example because it moves outside the domain of *consanguineal* kin to *affinal kin*, and this is felt to violate some domain boundary condition.

We have examined here just one aspect of the process of analogizing. A considerable amount of research has been done in cognitive psychology on the way people create and learn analogies. Real world analogies may be much more complex in form than indicated by the simple *A is to B as C is to D* format. An often cited real world example is the analogy created by Rutherford between the solar system and the hydrogen atom. In such an analogy there is a set of objects (the sun, the planets) and relations among the objects (the planets circle the sun, the sun is more massive than the planets, the sun attracts the planets, etc.). The relations found among the objects in the solar system are then mapped on to the objects of the atom – the nucleus is matched to the sun, the electrons to the planets, with the expectation that, as in the solar system, the electrons circle the nucleus, the nucleus is more massive than the electrons, the nucleus attracts the electrons, etc. As in kin term examples presented above, what remains constant is that the relations between *A, B, C* . . . in the original domain should be the same as the relations between *D, E, F* . . . in the target domain.

This kind of *structure-mapping* theory of analogy has been worked out in detail by Dedre Genter (1983, 1989), who has found that a major problem that people have in learning or making analogies is overcoming the surface differences in the attributes that characterize the objects in the two domains so that the underlying similarity of relations can be perceived. The difficulty in creating or understanding a good analogy is in finding the same structure of relations between *apparently* very different kinds of objects. To do so, people must distinguish between *attributes* of objects, which are simple one place predicates (x is red, x is a male, x is hot), and *relations*, which are two or more place predicates (x is greater than y, x is the opposite of y, x is identical to y, x is between y and z). Analogies ignore differences in attributes and point out similarity in relations.

Similarity judgments

The feature composition of terms can also be used to predict similarity judgments. To see how this works, let us consider a simple type of similarity task called the "triads test." In the triads test the respondent is presented with three objects and asked to select the object which is *most different*. For example, a respondent might be given the following three kin terms:

father uncle son

and asked to select the term which is most different in meaning. To do this the respondent must compare the three terms with respect to their features. For *father*, *uncle*, and *son* the semantic features are:

father	consanguineal	male	G1	+	collateral
uncle	consanguineal	male	G1	+	collateral
son	consanguineal	male	G1	–	direct

Note that *uncle* and *son* are different from each other with respect to *two* sets of features – *direct/collateral* and *ascending/descending* – while the other two pairs of terms (*father/son*, *father/uncle*) differ on only one feature. On the basis of this pattern of features, the respondent might reasonably choose either *uncle* or *son* as the most different, but never *father*. This is because if the respondent chose *father* it would leave *uncle* and *son* as the most similar pair of terms despite the fact that they have the *greatest* feature difference.[6]

In some cases the choice of the "most different term" is quite obvious. Given the triad:

mother daughter nephew

nephew is clearly the "most different." This can easily be seen by comparing the features of these terms:

mother	consanguineal	female	G1	+	direct
daughter	consanguineal	female	G1	–	direct
nephew	consanguineal	male	G1	–	collateral

[6] A detailed psychological model concerning the relations of similarity judgments to features has been presented by Tversky (1977).

Table 3.3. *All possible triads for the set* father, mother, son, daughter

1.	Father	(0)*	Mother	(4)	Son	(6)
2.	Father	(3)	Mother	(0)	Daughter	(7)
3.	Father	(5)	Son	(0)	Daughter	(5)
4.	Mother	(3)	Mother	(7)	Daughter	(0)

*Figures in parentheses indicate the number of times a term was selected as most different in meaning from the other two terms by ten respondents.

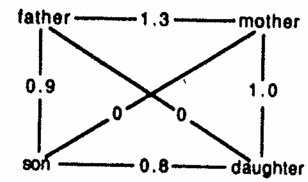

Figure 3.11 Pairings of selected kin terms.
Frequencies represent mean number of times terms were classed together

Nephew differs from *mother* on three features and from *daughter* by two features, while *mother* and *daughter* differ on only one feature.

The same technique can be used for more than three terms, simply by presenting all possible triads of these terms. For example, given the four terms *father*, *mother*, *son*, and *daughter*, four possible triads can be constructed. A sample of ten high school students was given a test in which these four possible triads were presented in random order and the students were asked to pick out the term which is most different imeaning in each triad. The results are presented in Table 3.3.

To construct a graphic representation of these results, we can compute the mean number of times each pair of kin terms are grouped together by summing the number of times each pair of terms is *not* selected as the most different term and dividing by the number of respondents. Thus in the table *father* and *mother* are classed together six times in the first triad and seven times in the second triad for a total of thirteen pairings, or a mean of 1.3 pairings. Figure 3.11 presents the data for mean pairing for all four terms. These results conform well to what we would expect on the basis of feature similarity. Note that no respondent paired the two terms that differed on *both* of the relevant features.

So far we have used the features of terms to predict similarity judgments. It is also possible to make the prediction in the other direction. That is, from similarity judgments it is possible to infer something about which terms share the most features. This means that *similarity judgments can be used to test hypotheses about the feature arrangements of a set of terms*. Most importantly, where there are different ways of analyzing a set of terms, similarity judgments can be used to decide which analysis corresponds best to the way individuals

<table>
<tr><th></th><th colspan="2">lineal</th><th colspan="2">co-lineal</th><th>ablineal</th></tr>
<tr><th></th><th>male</th><th>female</th><th>male</th><th>female</th><th></th></tr>
<tr><td>G+2</td><td>grandfather</td><td>grandmother</td><td rowspan="2">uncle</td><td rowspan="2">aunt</td><td rowspan="5">cousin</td></tr>
<tr><td>G+1</td><td>father</td><td>mother</td></tr>
<tr><td>G0</td><td colspan="2">[ego]</td><td>brother</td><td>sister</td></tr>
<tr><td>G-1</td><td>son</td><td>daughter</td><td rowspan="2">nephew</td><td rowspan="2">niece</td></tr>
<tr><td>G-2</td><td>grandson</td><td>granddaughter</td></tr>
</table>

Figure 3.12 Wallace and Atkins (1960) feature analysis of English kin terms

actually discriminate among terms. For example, several different analyses of English kin terms have been presented in the literature. The model we have been using, developed by A. K. Romney, presented at the end of Chapter 2, is just one of these alternatives. An earlier analysis presented by Wallace and Atkins (1960) had the form shown in Figure 3.12.

There are several major differences between the Wallace and Atkins analysis and the Romney analysis of English kin terms. Generation is treated in the Wallace and Atkins model as a *signed* distance up or down from ego, rather than as two features, one consisting of *absolute distance from ego*, the other consisting the *ascending/descending* dimension. The Wallace and Atkins analysis also has a three feature *lineal* vs. *co-lineal* vs. *ablineal* dimension in contrast to the two valued *direct/collateral* dimension used in our analysis in Chapter 2. Third, the terms *uncle*, *aunt*, *nephew*, and *niece* in Wallace and Atkins refer to both first and second generation kin types (i.e., not only is a parent's brother an *uncle*, but a grandparent's brother is also an *uncle*), and the term *cousin* is given as referring to any generation.[7]

It is important to understand that both the Romney analysis and the Atkins and Wallace analysis are equally effective at assigning the right *terms* to the relevant *kin types*. Both analyses work as models which individuals *could* use to refer appropriately to their kin. The question is, which model *do* Americans use? How do Americans conceive of kin – with three values of collaterallity, or two? With signed generation differences, or absolute generation differences? Which categories do Americans really use?

[7] For most English speakers these are *extended* uses of the basic meaning of the terms *uncle*, *aunt*, and *cousin*. Discussion of the distinction between basic and extended terms is presented in Chapter 5.

The issue of which analysis corresponds best to the way the natives actually categorize things is called the issue of *psychological reality*. As Wallace and Atkins state:

> The psychological reality of a individual is the world as he perceives and knows it, in his own terms; it is his world of meanings. A "psychologically real" description of a culture thus is a description which approximately reproduces in an observer the world of meanings of the native users of that culture. (1960:75)

Wallace and Atkins discuss a number of problems involved in trying to determine the psychological reality. They conclude:

> A problem for research, then, must be to develop techniques for stating and identifying those definitions which are most proximate to *psychological reality*. This is a formidable task. The formal methods of componential analysis, even with refinement and extension of their logico-semantic assumptions, will not yield discriminations between psychologically real and non-psychologically . . . real meanings . . . Ethnographers like Goodenough and Lounsbury obtain clues to psychological reality from observations on the cultural milieu of the terminology such as residence and marriage rules or historical changes. But the only way of achieving definitive knowledge of psychological reality will be to study the semantics of individuals both before and after a formal, abstract, cultural-semantic analysis of the terms has been performed. Simple demands for verbal definition, the use of Rivers' genealogical method, and analysis of the system of kinship behaviors may not be sufficient here: *additional procedures, by individual representative informants, of matching and sorting, answering hypothetical questions, and description of relationships in order to reveal methods of reckoning will all be required.* (Italics added) (1960:78)

In order to determine whether Romney's model or Wallace and Atkins' model corresponded most closely to the psychological reality of standard American-English speakers, a triads test was administered to 150 public high school students for the male kin terms by Romney and D'Andrade (1964). This test consisted of presenting in random order all the triads of the seven basic male kin terms (*father*, *son*, *brother*, *grandfather*, *grandson*, *uncle*, *nephew*) plus *cousin*. It would have been more comprehensive to use both male and female kin terms. However, a major drawback to the triads methods is that the number of triads increases drastically with the number of items. There are 56 possible triads for 8 kin terms, but 455 possible triads for 15 kin terms.[8]

After checking the questionaire forms for incomplete responses, failure to understand the instructions, etc., 116 forms were accepted for analysis. The results are given in Table 3.4 for mean number of times each pair of terms was classed together across all triads. Mean responses have a possible range from 0.0 to 6.0. The table has a skewed distribution of scores, with nine scores with frequencies above 2.0 and nineteen scores with frequencies below 2.0.

[8] The formula to compute the number of possible triads which can be constructed from n objects is $n * (n-1) * (n-2) / 6$.

Table 3.4. *Mean number of times each pair of kin terms was classed together*

Grandfather	Father	Brother	Son	Grandson	Uncle	Cousin	Nephew
Grandfather	*3.9*	1.0	1.4	*4.3*	1.5	0.6	0.9
Father		*2.4*	*3.9*	1.6	2.0	0.6	0.6
Brother			*3.8*	1.6	1.6	1.7	1.5
Son				*3.1*	0.6	1.4	1.2
Grandson					0.7	1.1	1.7
Uncle						*3.5*	*3.7*
Cousin							*4.2*

(n = 116) Scores over 2.0 appear in italic.

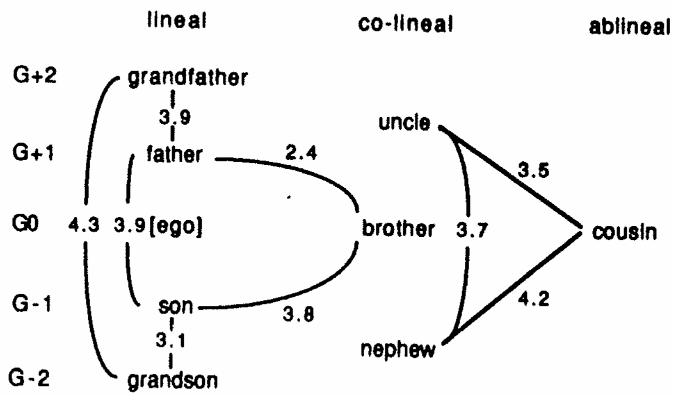

Figure 3.13 Diagrammatic representation of Wallace and Atkins (1960) feature analysis of English male kin terms
Connecting lines indicate terms paired together with high frequency. Numbers present mean frequency of pairings

Which model does this data support? It is hard to see the answer just from viewing a table of numbers. To make the results more apparent the two models have been put into diagrammatic form and the nine most highly similar pairs of terms plotted onto the diagram. Figure 3.13 gives the results for the Wallace and Atkins model. If the model had a good fit to the data, all the highly similar pairs would be adjacent to each other.

It is apparent that the Wallace and Atkins model does not fit the data very well. *Grandfather* and *grandson* are judged to be highly similar but are at opposite ends of the Wallace and Atkins dimension of generation. *Father* and *son* are both strongly paired with *brother,* although according to the Wallace and Atkins analysis a *brother* is different from *father* and *son* in being a collateral and a different generation. Similarly, *uncle*, *nephew*, and *cousin* show the same pattern of discrepancy.

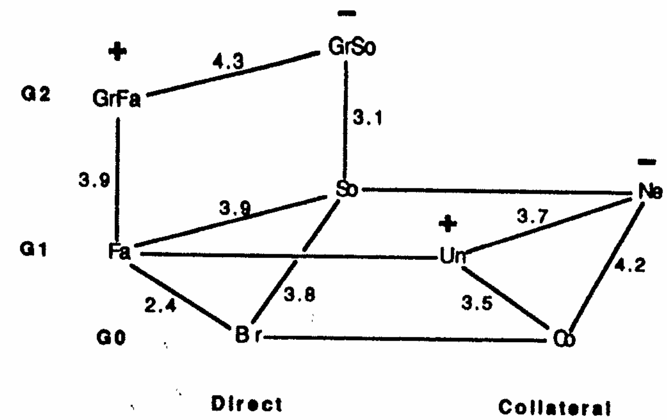

Figure 3.14 Diagrammatic representation of Romney feature analysis of English male kin terms
Connecting lines indicate terms paired together with high frequency. Numbers present mean frequency of pairings

Figure 3.14 presents the results for the Romney model. The diagram has been rearranged from the diagram in Chapter 2 into a three dimensional format to make it possible to visualize the orthogonal relation of the three dimensions of generation, collaterallity, and the *ascending/descending* dimension.
The data fits the Romney model very neatly. All of the high frequency pairings connect immediately adjacent terms.

From these results we can conclude that for Americans (or at least our sample of high school students) the basic male English kin terms are distinguished as in the Romney model by a dimension of absolute generation, an *ascending/descending* dimension, and a *direct/collateral* dimension. The evidence is counter to the Wallace and Atkins model which defines these dimensions differently.

A later study by Michael Burton and Sara Nerlove (1976) included both male and female terms in a balanced incomplete triad block design, in which a subset of all possible triads is selected such that all pairs of terms occur the same number of times. Using all sixteen basic English kin terms, they found four distinct dimensions; one was clearly a *male* vs. *female* dimension, while the other three were the same as the Romney dimensions described above. Other similarity judgment studies of the eight male English kin terms have also found the same general pattern of results.[9] With the use of multidimensional scaling programs, such as non-metric scaling and correspondence analysis, a direct graphic representation of English kin terms can be constructed from similarity

[9] See Wexler and Romney 1972 and Nakao and Romney 1984.

judgments alone; an early example of such an analysis is presented in Romney and D'Andrade (1964).

Overall, these various analyses show that it is quite feasible to use similarity judgments to test hypotheses about the psychological reality of different models. This result counters the objection made by Robbins Burling (1964) that the psychological reality of a componential analysis cannot be determined because there are too many logical possibilities. In the case of English kin terms, there is little doubt that the Romney model gives a better account of the way people make similarity judgments than the alternative model. The results are quite clear-cut. However, more important than these particular results, the discussion in the journals and articles concerning the alternative analyses of English kin terms concretized the issue of psychological reality. *The issue really has to do with the standards by which ethnographic descriptions are to be judged.* By the time the English kin term controversy was finished, a consensus had been built in cognitive anthropology that the models of how natives categorize the world should do more than account for what things get which labels; they should also account for the discriminations that individuals use to give things labels. Or, to paraphrase Wallace and Atkins, the ethnographic problem is not just to describe behavior, but to discover the individual's "world of meanings."

The feature composition of evaluative judgments

So far we have seen that feature composition strongly affects judgments of similarity. To what extent might feature composition affect other kinds of judgments, such as evaluations or preferences?[10] The hypothesis that responses to an object, such as evaluations and preferences, are influenced by the features of the object is called the *feature decomposition hypothesis*.

Let us continue with English kin terms to illustrate this hypothesis. A sample of American respondents is presented with a randomized list of all possible pairs of English kin terms (*mother/father*, *grandfather/son*, *aunt/daughter*, etc.), and asked to circle for each pair the relative "you would expect to be the warmer, friendlier, and more trustworthy person." For every respondent each kin term can be placed on a scale of warmth/ friendliness/ trustworthiness (*solidarity*) by counting the number of times each term is chosen. For the whole sample we can then obtain a mean *solidarity* score for each of the fifteen basic kin terms.

To what extent will these *solidarity* scores show the effects of feature decomposition? The most informative way to present such data is in a diagram, rather than a table of numbers. In Figure 3.15 the mean scores for a sample of

[10] Strictly speaking, *features* should apply only to lexical items, while the objects that the lexemes refer to are said to have *attributes*, such that the features of a term correspond to the criterial attributes of a class or object. However, for the sake of simplicity, *features* will be used both with reference to terms and the classes or objects labeled by these terms.

		direct		collateral	
		male	female	male	female
G2	+	grandfather 5.6 (6.1)	grandmother 8.3 (8.1)		
	-	grandson 4.5 (4.1)	granddaughter 5.9 (6.1)		
G1	+	father 9.9 (10.1)	mother 12.7 (12.1)	uncle 3.6 (3.9)	aunt 6.3 (5.9)
	-	son 8.4 (8.1)	daughter 9.7 (10.1)	nephew 2.0 (1.9)	niece 3.6 (3.9)
G0		brother 9.5 (9.2)	sister 10.8 (10.1)	cousin 4.1 (4.0)	

Figure 3.15 Observed and predicted *solidarity* scores for English kin terms (n = 65)
Predicted scores in parentheses; *r* between observed and predicted scores =.92.

sixty-five college undergraduates are presented within a feature diagram. In parentheses and to the right of each of the observed *solidarity* scores are the *predicted solidarity* scores. These solidarity scores were derived by first determining a *solidarity weight* for each of the features. To calculate the weight for a particular feature, the mean for all scores on a particular feature was calculated. This mean was subtracted from the mean of the matching terms on the opposing dimensional feature and the difference divided by two. Once the feature weights were found, the predicted score for a particular kin term was computed by adding together all the feature weights for that term plus an estimated grand mean. The predicted score for *nephew*, for example, consists of the sum of the weight for *male* (–1.0), *descending* (–1.0), *generation 1* (+2.0), *collateral* (–3.1), plus the estimated grand mean (+5.0), yielding a predicted score of 1.9.

The fit between the predicted and the observed scores is fairly good. The Pearson *r* between the two sets of scores is .91. It is interesting that the discrepancies between the predicted and the observed scores are also nicely patterned. In every case the ascending female terms (*mother*, *aunt*, *grandmother*) and the descending male terms (*son*, *nephew*, *grandson*) have higher *solidarity* scores than predicted by the feature scores, and the ascending male (*father*, *uncle*, *grandfather*) and the descending female (*daughter*, *niece*, *granddaughter*) have lower solidarity scores than predicted by the feature scores. It would appear one can expect a little more solidarity from senior females and junior males than either sex or seniority alone would predict.

Since the solidarity ratings used in this analysis are *aggregated*, these results do not indicate whether or not the same pattern occurs on the individual level. To check on the way individuals perform, individual respondents were selected and for each individual feature weights were calculated and checked to see how well they fit the observed scores. The correlation remains impressive, although slightly lower (the mean of these *r*'s was .82). For all respondents the feature weight for *female* was higher than for *male*, *ascending* had a greater weight than *descending*, and *direct* had a greater weight than *collateral*. Absolute generation showed much more individual variation, especially between *first generation* and *second generation* weights.

What this good fit between predicted and observed scores shows is that *in some cases* the way people evaluate a set of items can be predicted from the separate features which distinguish these items. For basic English kin terms, it appears that – at least in some tasks – what people do is average across features: how warm, friendly, and trustworthy a class of kin is expected to be is approximately the average of the *solidarity* weights for the features of sex, collaterallity, generation, and direction. These results would not occur if the actual criteria on which respondents made their judgments were not the same as, or highly correlated with, the linguistic features of the terms.

Another application of the feature model to psychological processes concerns child language learning. If features are the psychological discriminations that people make in determining which things belong in which categories, then the child, in learning to talk, will have the task of learning these discriminations. Since the child learns some features before others, there should be evidence for feature learning in the order in which children learn vocabulary. Terms with complex features should be learned later than terms containing only a subset of these features. Dedre Genter, for example, found that children understand the terms *give* and *take* before they understand the terms *buy* and *sell* (1978). In a general review, Eve Clark (1973) has argued that features play a significant part in child language learning, although complicated by other processes.

Summary

This chapter has presented the classic feature model which was developed in the late fifties and early sixties in anthropology. Because of their paradigmatic structure, kin terms were the prototypic example for most of this early work on features. The paradigmatic structure of kin terms made identification of genealogical features relatively straightforward, allowing the production of simple and compelling findings. Once a good example had been found, ideas about how features might be related to other phenomena could be tested and refined. The demonstration that features determined the structural organization of terms into paradigmatic or taxonomic forms, the analysis of the feature organization involved in multiple senses of a term, the development of the concept of "marking," the identification of the strong tendency towards conjunctive composition of features, the discovery of the relation between the

small size of short-term memory and the extreme limitation on the numbers of features defining a term, the analysis of the feature transformations involved in analogy and the relation between similarity judgments and feature overlap, all "fell out" of an expanding research agenda with considerable rapidity. Such periods are exciting for the people working within the agenda. Certainly I found it that way. There was a feeling that things were coming together and making sense.